# Restoring Artifacts with Electrolysis

***by Ted Kinsey***

Electrolysis is a standard technique in the artifact restoration business, and most of the tool collectors around here use it.

Here are the items you need to get started:

- A plastic tub
- A stainless steel or iron electrode
- Water
- Washing soda (*NOT baking soda!!*)
- A battery charger

Mix about a tablespoon of soda to a gallon of water. If you have trouble locating the washing soda, household lye will work just fine. The lye is a tad more nasty, so always wear eye protection and be sure to add the lye to the water (*NOT water to lye!!!*). The solution is weak, and is not harmful, though you might want to wear gloves.

**(Ed. note: Lye attacks protein quickly and irreversibly. In this regard it is much more of a problem than even strong acids such as sulfuric acid. Lye in the eye results in permanent cornea damage. Be very aware of the hazards of using it in electrolysis, although it does work very well.)**

The iron electrode works best if it surrounds the object to be cleaned, since the cleaning is "line of sight" to a certain extent. The iron electode will be eaten away with time. Stainless steel has the advantage (some alloys, but not all) that it is not eaten away. The electrode is connected to the positive (red) terminal and the object being cleaned, to the negative. Submerge the object, making sure you have good contact, which can be difficult with heavily rusted objects.

Turn on the power. If your charger has a meter, be sure some current is flowing. Again, good electrical contact may be hard to make but it is essential. Fine bubbles will rise from the object. Go away and come back in a few hours. Rub the object under running water with a plastic pot scrubber. Depending on the amount of original rust, you may have to re-treat. The clean object will acquire surface rust very quickly, so wipe it dry and dry further in a warm oven or with a hair dryer.

**The polarity is important!!** The surface rust is being converted to metallic iron, so the process is totally self-limiting. I have left things (by mistake) for several days: the water was largely gone by electrolysis, but the object was fine. Reverse the polarity and your object is being eaten away!!! The rust will go along with it, but that's not what you had in mind, is it??

There are lots of variants: suspending an electrode inside to clean a cavity in an object; using a sponge soaked in the electrolyte with a backing electrode to clean

spots on large objects or things that shouldn't be submerged (like with lots of wood).

The surface is left black. Rusted pits are still pits. Shiny un-rusted metal is untouched. The method will cope with any degree of rust, from surface to heavily scaled.

Use plastic and junk iron for electrodes. For electrodes, I buy cheap stainless spoons at the flea market for treating small stuff in a dishpan and large iron things as electrodes in my trashcan bath. The bath will last until it gets so disgusting that you decide it is time for a fresh one.There is nothing especially nasty about it-it's mildly basic-so disposal is not a concern, except you may not want all the crud in your drains.

## One caution: Painted surfaces **might** be damaged.

On antique tools, I generally treat immediately with a hard paste wax, applied with the tool hot enough to melt the wax (the oven or a heat gun is handy here).

Try it - it beats any other method, especially for antique tools, where that pickled look that acid gives totally destroys the value.